

PRECIPITATION.

[Expressed in inches and hundredths.]

The distribution of rainfall over the United States and Canada for June, 1886, as determined from the reports of about seven hundred stations, is exhibited on chart iii.

The precipitation of July, like that of June, is very unequally distributed and the areas of excesses and deficiencies nearly coincide with those of the latter month. The rainfall of the month is very small in the valleys of the Mississippi, Missouri, and Ohio rivers, especially large deficiencies occurring in Iowa, Illinois, Missouri, Nebraska, and Indiana, producing in those states very severe droughts, as will be seen by reference to the matter under the heading of "Drought" in this REVIEW. In New England, New York, Pennsylvania, the Lake region, Texas, New Mexico, and Arizona, the rainfall is also below the normal.

The area over which an excess of rainfall occurs is comparatively small, comprising in the East, Maryland, the South Atlantic states, Florida and the southern part of the east Gulf states; in the West, the Pacific coast region.

The following are some of the most marked departures from the normal precipitation at Signal Service stations:

Above normal.		Below normal.	
	Inches.		Inches.
Wilmington, North Carolina.....	14.91	Omaha, Nebraska.....	5.48
Jacksonville, Florida.....	9.58	Fort Supply, Indian Territory.....	5.18
Washington City.....	6.40	Leavenworth, Kansas.....	4.53
Smithville, North Carolina.....	6.12	Dubuque, Iowa.....	4.49
Sanford, Florida.....	5.46	Des Moines, Iowa.....	4.09
Baltimore, Maryland.....	3.76	Keokuk, Iowa.....	3.86
Augusta, Georgia.....	3.13	Saint Louis, Missouri.....	3.59
Cedar Keys, Florida.....	3.12	La Crosse, Wisconsin.....	3.52
Pensacola, Florida.....	3.10	Davenport, Iowa.....	3.35

In the following table are shown, for the several geographical districts, the normal precipitation for July; the average for July, 1886, and the excess or deficiency as compared with the normal:

Average precipitation for July.

Districts.	Average for July, Signal-Service ob- servations.		Comparison of July, 1886, with the aver- age for several years.
	For several years.		
	Inches.	Inches.	
New England.....	4.12	2.91	-1.21
Middle Atlantic States.....	4.29	4.84	+0.55
South Atlantic States.....	5.65	8.72	+3.07
Florida Peninsula.....	5.70	10.91	+5.21
Eastern Gulf States.....	4.87	4.24	-0.63
Western Gulf States.....	3.79	2.38	-1.41
Rio Grande Valley.....	1.85	3.22	+1.37
Tennessee.....	4.09	4.13	+0.04
Ohio Valley.....	4.37	3.20	-1.17
Lower lake region.....	3.75	2.09	-1.66
Upper lake region.....	3.30	1.42	-1.88
Extreme northwest.....	3.14	2.64	-0.50
Upper Mississippi Valley.....	4.16	0.78	-3.38
Missouri Valley.....	5.02	0.88	-4.14
Northern slope.....	1.83	0.94	-0.89
Middle slope.....	3.27	1.69	-1.58
Southern slope.....	3.30	1.66	-1.64
Southern plateau.....	2.16	0.74	-1.42
Middle plateau.....	0.35	0.30	-0.05
Northern plateau.....	0.55	0.11	-0.44
North Pacific coast region.....	0.68	1.22	+0.54
Middle Pacific coast region.....	0.01	0.08	+0.07
South Pacific coast region.....	0.07	0.09	+0.02

Table of excessive and greatest monthly precipitation for July, 1886.

Station.	Specially heavy.		Largest monthly.	Station.	Specially heavy.		Largest monthly.
	Date.	Amt.			Date.	Amt.	
Alabama.				Alabama—Con.			
Evergreen a.....	12, 13	3.33	11.09	Pine Apple.....	25	2.00	6.37
Do.....	22	3.15		Greensborough.....	21	2.07	
Do.....	25	2.00		Do.....	27	2.98	
Evergreen b.....			7.76	Lineville.....	1	2.50	
Selma.....	27	3.20		Colorado.			
Eufaula.....			7.37	West Las Animas.....	24, 25	3.36	
Mobile.....			6.64	Connecticut.			
Mt. Vernon B'ks.....			6.59	Hartford.....	14, 15, 16	3.16	
Fort Deposit.....	11	2.95	6.50				

Table of excessive and greatest monthly precipitation—Continued.

Station.	Specially heavy.		Largest monthly.	Station.	Specially heavy.		Largest monthly.
	Date.	Amt.			Date.	Amt.	
Dist. of Columbia.				New Hampshire.			
Washington City.....	2	2.53	10.63	Mt. Washington.....	15	3.62	6.30
Do.....	26	3.25		Wier's Bridge.....	15, 16	2.43	
Distrib'g Reservoir.....	2, 3	2.72	8.40	Belmont.....	15, 16	2.00	
Do.....	27	2.20		Antrim.....	15, 16	2.50	
Receiving Reservoir.....	2, 3	2.71	8.12	New Jersey.			
Do.....	27	2.01		Egg Harbor City.....			7.95
Florida.				Vineland.....	14, 15, 16	2.80	6.47
Alva.....	16 to 19	11.23	18.58	Upper Montclair.....	14, 15	2.16	
Limona.....	9	4.65	17.32	Paterson.....	14, 15	2.28	
Do.....	17, 18	6.11		New York.			
Fort Meade.....	9	2.00	16.00	Auburn.....	18	2.41	7.83
Do.....	17, 18	4.40		Setauket.....	16	2.18	7.43
Do.....	28, 29	4.65		Mountainville.....	15, 16	2.93	
Jacksonville.....	6	3.49	14.97	North Carolina.			
Do.....	19, 20	2.20		Wilmington.....	1	4.41	21.12
Do.....	23, 24	4.04		Do.....	5, 6	2.73	
Waldo.....	25	2.73	14.54	Do.....	15, 16	9.06	
Do.....	27, 28	2.89		Weldon a.....	4, 5	7.90	15.33
Archer.....	16	3.64	14.49	Do.....	14, 15	3.77	
Do.....	23, 24, 25	5.01		New River Inlet.....	1	4.00	12.44
Tallahassee.....	2, 3	2.05	14.30	Do.....	15	2.50	
Do.....	9	2.20		Smithville.....	1	2.52	11.99
Do.....	11	2.90		Do.....	6, 7	2.87	
Do.....	16, 17	2.05		Do.....	15, 16, 17	3.34	
Cedar Key.....	9, 10	2.63	11.72	Weldon b.....	4	3.00	10.40
Do.....	27, 28	2.58		Do.....	13, 14	3.81	
Merritt's Island.....	18, 19	2.22	11.23	Lenoir.....	1, 2, 3	4.21	9.10
Do.....	23, 24	2.97		Salisbury.....	1	2.49	8.57
Do.....	28, 29	2.09		Lincolnton.....	1	2.95	8.54
Sanford.....	18, 19	2.16	10.21	Charlotte.....	1	3.85	8.05
Pensacola.....	27, 28	2.06	8.85	Do.....	14	2.15	
Live Oak.....	25, 26	2.22	7.52	Hatteras.....	1	4.04	7.57
Fort St. Augustine.....			6.87	Chapel Hill.....	1, 2	3.15	7.48
Key West.....			6.72	Lumberton.....	1	3.18	7.09
Fernandina.....			6.72	Goldborough.....	5, 6	2.33	6.91
Georgia.				New-Berne.....	1	2.00	6.66
Thomasville.....	1, 2	2.29	12.71	Raleigh.....	1, 2	2.20	
Do.....	5	2.49		Statesville.....	1	2.77	
Do.....	25	2.40		Ridgeway.....	1, 2	2.05	
Bainbridge.....	1, 2	4.95	9.94	Ohio.			
Quitman a.....			9.85	West Milton.....			6.75
Jessup.....	15, 16, 17	3.01	9.71	College Hill.....	13	2.2	
Saint Mary's.....			8.85	North Lewisburg.....	30	2.20	
Eastman.....	1	6.03	8.73	Columbus.....	30	2.84	
Do.....	22	2.04		Pittsburg.....	26	2.09	
Macon.....	1	2.35	8.63	Oregon.			
Do.....	22, 23	2.48	8.63	Mount Angel.....	8	2.50	
Quitman b.....	31	2.00	8.07	Pennsylvania.			
Augusta.....	1	2.26	7.51	West Chester.....			6.31
Brunswick.....			7.20	Troy.....	12	2.00	6.28
Alapaha.....	23, 24	2.25	7.16	Germantown.....	10	2.00	
Savannah.....	22, 23	2.27	7.02	Wellsborough.....	25, 26	2.18	
Smithville.....	1	3.00	6.99	South Carolina.			
Columbus.....	7, 8	2.65	6.54	Kingston.....	1	3.39	8.70
Millen.....	1, 2	2.07	6.11	Aiken.....	1	2.30	8.40
Toccoa.....	15	2.03	6.08	Do.....	11	2.35	
Cannak.....	1	2.13		Hardeeville.....	24	2.24	7.40
Union Point.....	1	2.40		Blackville.....	1	2.53	7.26
Washington.....	1	2.30		Do.....	22, 23	2.01	
Indiana.				Branchville.....	14, 15	2.06	6.86
Farmland.....	12	2.35	8.13	Anderson.....	1	2.55	6.51
Logansport.....	20	3.10		Do.....	15	2.00	
Richmond.....	12	2.00		Do.....	1	2.13	6.24
Kansas.				Greenwood.....	15	2.23	
Fort Hays.....	23	3.88	6.66	Do.....	1	3.85	6.23
Do.....	31	3.32		Columbia.....	14	2.40	6.21
Yates Centre.....	24	2.34		Saint Matthew's.....	1	2.06	6.06
El Dorado.....	24	2.24		Greenville.....			
Independence.....	30	2.68		Do.....	11	2.20	
Salina.....	24	2.04		Cheraw.....	1	2.05	
Wellington.....	23, 24	2.75		Florence.....	1	2.38	
Do.....	30, 31	2.90		Charleston.....	16, 17	2.25	
Concordia.....	23	2.60		Allendale.....	8	2.00	
Louisiana.				Datesburg.....	1	3.25	
Amite City.....	12	3.00	8.22	Chester.....	1	3.00	
Grand Coteau.....	6, 7	2.09	8.08	Kirkwood.....	1	2.30	
Do.....	21, 22, 23	3.03		Spartanburg.....	1	2.60	
Alexandria.....	7	2.48		Austin.....	8	2.63	
Maryland.				Comfort.....	7, 8	3.00	
Fallston.....	2	2.42	10.03	Tennessee.			
Do.....	14, 15	2.51		Greeneville.....	1, 2, 3	6.82	9.12
Do.....	25, 26	3.25		Knoxville.....	3, 4	2.38	6.25
Fort McHenry.....	15	3.10	9.08	Brownsville.....	26, 27	2.48	
Great Falls.....	2, 3	2.67	8.42	Memphis.....	25, 26	4.54	
Baltimore.....	15	2.09	8.08	Texas.			
Do.....	21	2.11		Belton.....	27	2.00	
Woodstock.....	2	2.10		Corsicana.....	23	2.06	
Massachusetts.				Hearne.....	21, 22	2.10	
Dudley.....	15, 16	3.05		Vermont.			
Princeton.....	15, 16	2.88		Poultney.....	26, 27	2.15	
Worcester.....	15	2.02		Virginia.			
Westborough.....	15, 16	2.17		Accotink.....	1, 2	2.32	8.34
Michigan.				Do.....	13	2.15	
Detroit.....	13, 14	2.32		University of Va.....	1, 2	3.82	8.34
Minnesota.				Rappahannock.....			
Moorehead.....	3	4.50		Station.....	13, 14	2.67	7.10
Mississippi.				Bruington.....			6.80
Lake.....	26	3.70		Wytheville.....			6.65
Macon.....	27	2.04		Dale Enterprise.....			6.13
Grenada.....	27	2.50		Washington Ter.....			
Missouri.				Tatoosh Island.....			6.52
Carthage.....	24	7.21	10.28	West Virginia.			
Pierce City.....	24, 25	8.00	8.40	Parker's Ridge.....	26	3.34	

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows, for certain stations, as reported by voluntary observers, the average precipitation for the month of July for a series of years; the precipitation for July, 1886; and the departures from the average:

Station.	County.	Average pre- cipitation for July.	Number of years.	Precipitation for July, 1886.	Departure.
		Inches.		Inches.	Inches.
<i>Arkansas.</i>					
Lead Hill.....	Boone.....	8.34	4	5.91	- 2.43
<i>California.</i>					
Sacramento.....	Sacramento.....	0.01	20	0.00	- 0.01
<i>Connecticut.</i>					
Canton *.....	Hartford.....	4.47	25	4.52	+ 0.05
Hartford *.....	Hartford.....	4.53	15	4.72	+ 0.19
Middletown *.....	Middlesex.....	4.08	28	4.27	+ 0.19
New Haven *.....	New Haven.....				
Wallingford *.....	New Haven.....	4.06	29	4.23	+ 0.17
<i>Dakota.</i>					
Webster.....	Day.....	7.54	4	1.37	- 6.17
<i>Illinois.</i>					
Anna.....	Union.....	3.80	11	1.16	- 2.64
Mattoon.....	Coles.....	2.94	6	2.60	- 0.34
Peoria.....	Peoria.....	4.02	30	0.47	- 3.55
Riley.....	McHenry.....	3.96	25	0.81	- 3.15
Rockford.....	Winnebago.....	4.36	13	0.35	- 4.01
Sycamore.....	De Kalb.....	6.14	5	0.67	- 5.47
<i>Indiana.</i>					
Lafayette.....	Tippecanoe.....	3.56	7	2.14	- 1.42
Logansport.....	Cass.....	4.02	31	4.80	+ 0.78
Mauzy.....	Rush.....	2.62	6	2.63	+ 0.01
Spiceland.....	Henry.....	4.43	28	3.43	- 1.00
Vevay.....	Switzerland.....	4.15	21	1.55	- 2.60
<i>Iowa.</i>					
Monticello.....	Jones.....	4.30	33	0.63	- 3.67
<i>Kansas.</i>					
Atchison.....	Atchison.....	3.90	22	0.12	- 3.78
Independence.....	Montgomery.....	4.30	14	3.60	- 0.70
Lawrence.....	Douglas.....				
Wellington.....	Sumner.....	4.22	8	5.65	+ 1.43
Yates Centre.....	Woodson.....	4.76	6	3.99	- 0.77
<i>Maine.</i>					
Cornish.....	York.....	4.50	27	3.10	- 1.40
Gardiner.....	Kennebec.....	3.34	48	1.93	- 1.41
Orono *.....	Penobscot.....	3.21	18	1.05	- 2.16
<i>Maryland.</i>					
Fallston.....	Harford.....	3.63	15	10.03	+ 6.40
<i>Massachusetts.</i>					
Amherst *.....	Hampshire.....				
Cambridge *.....	Middlesex.....	3.46	45	3.23	- 0.23
Chestnut Hill *.....	Middlesex.....	3.59	11	2.59	- 1.00
Framingham *.....	Middlesex.....	3.38	12	3.15	- 0.23
Lake Cochituate *.....	Middlesex.....	4.27	35	3.30	- 0.97
Lynn *.....	Essex.....	3.50	12	4.05	+ 0.55
Mystic Lake *.....	Middlesex.....	3.80	11	3.72	- 0.08
New Bedford *.....	Bristol.....	3.34	73	2.69	- 0.65
Somerset.....	Bristol.....	3.74	16	2.04	- 1.70
Springfield *.....	Hampden.....	4.33	39	4.27	- 0.06
Taunton *.....	Bristol.....	3.27	13	2.84	- 0.43
Waltham *.....	Middlesex.....	3.73	62	3.03	- 0.70
Williamstown *.....	Berkshire.....	4.90	19	5.20	+ 0.30
Worcester *.....	Worcester.....				
<i>Nebraska.</i>					
Carson City.....	Ormsby.....	0.24	8	1.25	+ 1.01
<i>New Brunswick.</i>					
Saint John *.....	Saint John.....	3.98	26	2.79	- 1.19
<i>New Hampshire.</i>					
Concord *.....	Merrimac.....	3.80	31	2.56	- 1.24
Hanover *.....	Grafton.....	3.16	18	1.75	- 1.41
<i>New Jersey.</i>					
South Orange.....	Essex.....	4.44	16	3.48	- 0.96
<i>New York.</i>					
Factoryville.....	Tioga.....	2.77	5	5.43	+ 2.66
Palermo.....	Oswego.....	3.20	33	1.83	- 1.37
Plattsburg Barracks.....	Clinton.....	3.26	17	3.77	+ 0.51
<i>Ohio.</i>					
Wauseon.....	Fulton.....	4.32	14	0.31	- 4.01
Westerville.....	Franklin.....	4.36	12	1.33	- 3.03
<i>Pennsylvania.</i>					
Dyberry.....	Wayne.....	4.58	15	2.84	- 1.74
<i>South Carolina.</i>					
Kirkwood.....	Kershaw.....	4.09	20	4.78	+ 0.69
Stateburg.....	Sumter.....	3.36	6	4.76	+ 1.40
<i>Texas.</i>					
New Uln.....	Austin.....	4.33	15	2.10	- 2.23
<i>Vermont.</i>					
Lunenburg *.....	Essex.....	3.98	38	2.32	- 1.66
Newport *.....	Orleans.....	4.32	12	4.60	+ 0.28
Strafford *.....	Orange.....	4.27	12	3.90	- 0.37
<i>Virginia.</i>					
Bird's Nest.....	Northampton.....	4.59	18	5.05	+ 0.46
Dale Enterprise.....	Rockingham.....	3.84	6	6.13	+ 2.29
Variety Mills.....	Nelson.....	3.28	8	4.91	+ 1.63
Wytheville.....	Wythe.....	4.05	22	6.65	+ 2.60
<i>Washington Territory.</i>					
Tacoma.....	Pierce.....	0.39	3	1.44	+ 1.05
<i>West Virginia.</i>					
Helvetia.....	Randolph.....	7.06	10	4.82	- 2.24
<i>Wisconsin.</i>					
Madison.....	Dane.....	4.55	30	0.79	- 3.76

* From the "Bulletin of the New England Meteorological Society."

The following notes, in connection with this subject, are furnished by voluntary observers:

California.—Sacramento: the only rainfalls in July during the last twenty years were 0.21, in 1876, and 0.003, in 1880.

Illinois.—Anna, Union county: the greatest July rainfall during the past eleven years was 11.09, in 1875; the least occurred in 1880, when no rain fell.

Riley, McHenry county: the total rainfall for the month is less than that of any July during the past twenty-five years.

Indiana.—Logansport, Cass county: the rainfall of July, 1869, 13.10, is greater than that of any July in the last thirty-one years, and that of July, 1863, 0.96, is less.

Vevay, Switzerland county: the total rainfall of July, 1874, 9.80, is the greatest, and that of July, 1869, 0.90, is the least, that has fallen in any July during the past twenty-one years.

Iowa.—Monticello, Jones county: the greatest July rainfall during the past thirty-three years was 10.93, in 1883; least, 0.60, in 1874. The total rainfall for June and July, 1886, 2.04, is the least that has fallen in those months during the past thirty-three years.

Kansas.—Wellington, Sumner county: during the last eight years the greatest July rainfall occurred in 1883, 6.64; least in 1884, 1.89.

Maryland.—Fallston, Harford county: the rainfall of the month, 10.03, is greater than that of any July in the past fifteen years; the least July rainfall in that time occurred in 1881, 1.42.

New York.—Palermo, Oswego county: during the last thirty-three years the largest July rainfall occurred in 1874, 6.60; the least in 1882, 0.64.

Ohio.—Westerville, Franklin county: the greatest July rainfall in the past twelve years was 9.70, in 1876; least, 1.33, in 1886.

Texas.—New Uln, Austin county: during the past fifteen years the largest July rainfall occurred in 1873, 14.38; the least in 1884, when none fell.

Virginia.—Dale Enterprise, Rockingham county: during the past six years the largest July rainfall occurred in 1882, 6.84; the least in 1883, 1.13.

Variety Mills, Nelson county: the largest July precipitation in the past eight years occurred in 1880, 5.12; least in 1883, 1.68.

SNOW.

Snow fell during the month at Pike's Peak, Colorado, on the 5th, 21st, and 29th; total amount of unmelted snowfall, 2.4 inches. Snow also fell at Mount Washington, New Hampshire on the 23d, amount, 0.1 inch.

HAIL.

Saint Paul, Minnesota: a disastrous hail and wind storm passed over Swift and Brown counties on the night of the 8-9th. In Swift county about seven thousand acres of grain were completely destroyed and many houses badly damaged. Numerous trees were blown down and many animals killed. At Sleepy Eye, in Brown county, nearly every house in the town was moved from its foundation by the high wind, and crops of all kinds in the surrounding country were badly injured; wheat being beaten to the ground and corn broken off.

Kankakee, Kankakee county, Illinois: on the night of the 9-10th a very severe hail storm passed over a section of country ten miles southwest of this place, the hail-stones were large and fell over an extensive area of country in which crops were almost completely destroyed. Corn, six feet high, was broken off close to the ground, grass and oats were cut or beaten to the ground. All the windows on the north side of buildings, in the track of the storm, were broken. During the storm high wind and intense lightning prevailed. Several houses and barns were unroofed and considerable damage was done to fencing.

Dixon, Lee county, Illinois: a severe thunder-storm, accompanied by heavy hail, passed through this county on the night of the 11-12th. Great damage was done to crops of all kinds, especially to fruit.

Wabash, Wabash county, Indiana: an extensive and damaging rain and hail storm visited this place and the adjoining country on the afternoon of the 12th. Fruit trees were stripped of leaves and fruit by hail, and fences were blown down. The hail fell to the depth of several inches, and did great damage in the country to growing crops, principally to corn and oats. The storm was about three miles wide and travelled toward the southeast.

Cleveland, Ohio: a heavy rain storm visited this city on the 13th and would have been of great value to crops and other vegetation except for the accompanying hail, which fell with great force for ten minutes. The hail-stones were very large, some being reported three inches long, and did considerable damage to gardens in the suburbs. All over the northern part of the state the storm was of unusual severity, and reports

Report of hail storms for the month of July, 1886, by Lieut. J. P. Finley, Signal Corps, U. S. Army, Assistant.

Place.	Date.	Time.	Length of path. Miles.	Width of path. Miles.	Character of clouds.	Size of hail-stones.	Maximum velocity of wind (estimated). Miles.	Character of property destroyed.	Value of property destroyed.	Number of people killed.	Number of people wounded.	Number and kind of animals killed.	Authority.
Steele, Dakota.....	3	2 p. m.				Small		Barns and out-houses.	Light				"Pioneer Press," Saint Paul, Minnesota.
Sleepy Eye and Birch Cooley, Minnesota.	7	11 p. m.						1 barn and out-houses.	Light				W. G. Bartley.
Scranton and South Abington, Pennsylvania.	7	6 p. m.	30	4	Green heavy clouds.	Large walnuts.	Very high.	Several houses and barns and crops.	Considerable				G. W. Wideman, "New York Herald," and "Scranton Republican."
Big Stone City, Millbank, Wilmet, Corona, and Hartford, Dakota.	8	6 to 7 30 p. m.	12 to 20	10	Very dark, low-rolling clouds.	Very large.	60	Numerous buildings and large amount of crops.	\$200,000				J. A. Rickert, postmaster at Wilmet, "Pioneer Press," and numerous clippings.
Madison, Sleepy Eye, Perry, Benson, Mankato, West Newton, Hill, and Foster, Minnesota.	8	12.30 to 8 p. m.	10 to 150	1 to 4		Various sizes.	70 to 80	5 houses, 6 barns, and numerous out-houses and large amount of crops.	Very great		1		C. Carney, Alex. Harkin, "Moorhead News," and numerous clippings.
Chebanse, Chilton, Ashkum, Saybrook, Elwood, Arrow-smith, and Crescent City, Illinois.	9	5 to 5.30 p. m.	10	3 to 7	Dark, low-rolling clouds.	Very large.	Hurricane.	Numerous houses and barns and large amount of crops.	Considerable			Numbers of various animals.	W. P. Kirkpatrick, T. J. Pursell, "Saybrook Gazette," and numerous clippings.
Richmond, Anderson, Liberty, Treaty, Wabash, Dundee, Franklin, Fairview, Fairmount, Jonesborough, Rich Valley, New Holland, and New Cumberland, Indiana.	12	2 to 7 p. m.	8	1/2 to 2	Very dark, low-rolling clouds.	Very large.	40 to 50	Numerous dwellings, barns, and out-houses, also large amount of crops.	\$100,000			Fowl and cattle.	Ryland Ratliff, J. Copeland, Jos. Newberg, Dr. J. B. Ebert, D. O. French, F. M. Wright, and O. L. Moore, "Commercial Gazette," and "Chicago Inter-Ocean."
Morrow and Centerville, Ohio.	12	11 p. m.				Small	60	Several buildings. Crops ruined.	\$75,000				W. B. Betson and "Commercial Gazette."
Joliet, Illinois.....	12	Not given				Large	Gale	Crops	Considerable				"Commercial Gazette" and "Chicago Inter-Ocean."
Wabash, Indiana.....	13	2.30 p. m.		3		Large		Crops	Considerable				"Corry Weekly Herald."
Schoolcraft, Oshkimo, Texas, and Gobleville, Michigan.	13	2 p. m.		1		Large		Crops	Considerable				Clippings.
Randolph and Chautauqua, New York.	13	6 p. m.		2		Large goose eggs.		Several buildings and crops	\$30,000			Chickens and turkeys.	A. Nichols, "Crawford Journal," "Commercial Gazette," and clippings.
Frenchtown, Millbrook, Perrine, North East, Wilson Mills, Oil City, Jamestown, and Pittsburg, Pennsylvania.	13, 14	9.30 p. m., 13th, to 2 a. m., 14th.				Large	Gale	Timber, crops, fences, and several buildings.	Considerable				G. Coureux, H. B. Rickard, John H. Hamilton, D. Videtto, G. W. Long, F. W. McCoy, and "Commercial Gazette," and clippings.
Pleasant Grove, Steubenville, Smithfield, and Holmes county, Ohio.	13, 14	11.30 p. m., 13th, to 4 a. m., 14th.				Hens' eggs.		Several houses, 1 church, barns, and crops.	Considerable				James V. Stillwell and "Commercial Gazette."
Crawford Corners, Shaw's Landing, and Rundell's, Pennsylvania.	17	2.30 to 3.30 p. m.		2		Hens' eggs.	Very heavy	Fences and crops.	Considerable				W. H. Seward, J. M. Beat-tie, and L. C. Fleming.
Fredericksburg, Nebraska.	19	Not given						1 church.	Considerable				Clipping.
Portions of Huron and Sanilac counties, Michigan.	21	Not given		2				2 barns.	Considerable	4		1 horse	Clipping.
Mayville, Grafton, Pembina, Saint Thomas, Huron, Saint Andrews, Conway, Blanchard, Portland, and Valley Springs, Dakota.	23, 24	5 p. m., 23d, to 3.30 p. m., 24th.	20 to 60	3 to 8		Hens' eggs to turkeys' eggs.	60	1 dwelling, 1 church, 1 barn, and large amount of crops.	\$500,000		Sev-eral.	Fowl, and maiming farm animals.	Peter Daly, E. E. Daly, and D. Robertson; post-masters at Portland and Valley Springs, "Pioneer Press," and "State Journal," Illinois, and clippings.
Hendrum and Warren, Minnesota.	23, 24	5 p. m., 23d, to a. m., 24th.				Hens' eggs.		Crops	Considerable			Pigs and chickens.	"Pioneer Press," postmaster at Hendrum, and clipping.
Kensington, Ohio.....	26	3 p. m.				Hickory nuts.		Crops	Considerable				"Cincinnati Enquirer."
Corona, Dakota.....	27	Not given	1	20 rds.		Large		1 dwelling.	Considerable				J. A. Rickert.
Pittsburg, Pennsylvania.	27	11 a. m.				Large	Very heavy	1 dwelling.	Considerable				Clipping.
Painted Post, New York.	29	6 p. m.				Large		Tobacco and other crops.	Considerable				Clipping.
Corona, Dakota.....	30	Not given				Large		Crops	Considerable				J. A. Rickert.

show great damage to crops caused by the hail and heavy wind, and to buildings from lightning. In Shelby ten buildings were struck, several barns were burned, and dwelling houses shattered.

Randolph, Chatauga county, New York: a destructive hail storm occurred here on the afternoon of the 13th, doing great damage to crops and fruit, and breaking many windows. The hail fell in large quantities, covering the hills near the village with ice. The damage to crops amounted to several thousand dollars.

Joilet, Will county, Illinois: a very heavy wind, hail, and rain storm occurred here on the afternoon of the 13th. The wind blew a gale, and the ground was completely covered with hail; the stones were very large and did much damage to corn.

Detroit, Michigan: a severe thunder-storm, accompanied by hail, passed over this place on the 13th. The hail-stones were

large, and cut down corn and other vegetation, while leaves and branches were stripped from trees. Several structures were struck by lightning and two barns were burned.

Harrisonburg, Rockingham county, Virginia: a severe hail storm passed over this place about noon of the 14th. Hail-stones fell as large as hickory nuts, and did much damage to growing crops.

Milton, Chittenden county, Vermont: a heavy hail storm occurred in this county on the 18th. At this place it was very destructive to crops. Much damage was done to fruit trees.

Winchester, Virginia: a destructive hail storm occurred near this place on the afternoon of the 18th. The track of the storm was about nine miles long and about half a mile wide, within this area vegetation suffered great damage from hail-stones, which were about the size of walnuts.

Norridgewock, Somerset county, Maine: a heavy hail and

wind storm passed over Madison and this place on the 19th. The hail-stones were as large as hen's eggs, and were destructive to corn and other crops.

Sharpsburg, Alleghany county, Pennsylvania: on the 22d, at 7.30 p. m., an unusually heavy hail storm occurred at De Haven Station, on the Pittsburg and Western Railroad.

Grafton, Walsh county, Dakota: on the afternoon of the 24th a disastrous thunder and hail storm passed over this vicinity. The storm travelled eastward, and from Saint Thomas across the Red River into Minnesota, it passed over an area five miles in width and thirty in length. Within this space hail-stones fell as large as hen's eggs and were unusually destructive. The wheat crop on 250,000 acres is reported to have been entirely destroyed, leaving many farmers destitute. Several persons were severely injured.

Saint Vincent, Minnesota: a very heavy thunder-storm, accompanied by rain and hail, occurred here on the afternoon of the 24th; serious injury was sustained by all kinds of vegetation.

Warren, Marshall county, Minnesota: this county was visited by a destructive hail-storm on the night of the 24-25th. The storm commenced at the town of Argyle, and passed over the towns of Middle River, Alma, Toldol, and Comstock. Hail as large as hen's eggs fell for about twenty minutes, destroying grain and breaking windows. It is reported that 25,000 acres of grain were destroyed in the vicinity of Mayville.

Sharon, Mercer county, Pennsylvania: on the afternoon of the 29th a destructive hail storm occurred in this county. Corn and other crops were in many places completely ruined.

Williamsport, Lycoming county, Pennsylvania: on the afternoon of the 29th a hail storm of great severity visited the western part of this county. Hail fell in great quantities, and many of the stones were as large as hen's eggs.

Hail was also reported to have fallen in the various states and territories on the following dates:

Arkansas.—Little Rock, 10th.

Colorado.—Pike's Peak, 2d, 17th, 19th; Montrose, 12th.

Connecticut.—New Haven, 18th; Southington, 29th.

Dakota.—Webster, 2d; Bismarck, Fort Totten, and Fort Yates, 3d; Fort Meade, 6th.

Illinois.—Pekin, 9th; Windsor, 9th, 14th; Chicago, 13th.

Indiana.—Logansport, 12th; Lafayette, 12th, 13th.

Iowa.—Keokuk, 9th; West Union, 12th.

Kansas.—Salina, 7th; Allison, 18th.

Kentucky.—Louisville and Frankfort, 14th.

Maine.—Portland, 19th.

Massachusetts.—Heath, 26th, 27th; Edgartown and Princeton, 30th.

Michigan.—Detroit and Grand Haven, 13th.

Missouri.—Central College, 13th.

Montana.—Fort Assinaboine and Helena, 4th.

Nebraska.—Valentine, 27th; Hay Springs, 30th.

Nevada.—Carson City, 16th, 19th.

New Jersey.—Readington, 18th; Sandy Hook, 30th.

New York.—Penn Yan, 17th; White Plains and Factoryville, 18th; Ithaca and Menand's Station, 29th.

Ohio.—North Lewisburg, 7th; Cincinnati, Yellow Springs, and Tiffin, 14th; Cleveland, 13th, 14th, 29th; Columbus and Garrettsville, 17th; Hiram, 17th, 26th.

Oregon.—Roseburg, 19th.

Pennsylvania.—Pittsburg, 17th; Wellsborough and Eastbrook, 17th, 26th.

South Carolina.—Stateburg, 12th, 14th; Spartanburg, 14th.

Tennessee.—Nashville, 10th; Knoxville, 10th, 14th; Austin, 13th.

Utah.—Frisco, 19th.

Vermont.—Strafford, 18th.

Virginia.—University of Virginia, 8th, 23d; Dale Enterprise, 14th, 25th; Wytheville, 8th, 14th; Chincoteague, 23d; Variety Mills, 27th.

West Virginia.—Clarksburg, 13th.

Wisconsin.—Madison, 10th, 11th, 19th.

SLEET.

Sleet occurred at Pike's Peak, Colorado, on the following dates: 4th to 7th, 12th, 16th, 20th, 21st, 22d, 25th, 27th, 31st; at Mount Washington, New Hampshire, on the 23d.

RAIN FROM A CLOUDLESS SKY.

The observer at Louisville, Kentucky, states that "on the 27th, at 12.30 a. m., the unusual phenomenon of rain from a cloudless sky was observed; light rain fell for ten minutes."

TEMPERATURE OF WATER.

The following table shows the highest and lowest temperatures of water observed at the several stations; the monthly ranges of water temperature; the average depth at which the observations were made; and the mean temperature of the air:

Temperature of water for July, 1886.

Station.	Temperature at bottom.		Range.	Average depth, feet and tenths.	Mean temperature of the air at station.
	Max.	Min.			
Atlantic City, New Jersey	77.0	69.4	7.6	12.1	72.2
Alpena, Michigan	72.6	63.5	9.1	12.5	64.4
Augusta, Georgia	86.0	70.4	15.6	12.9	77.9
Baltimore, Maryland	78.9	72.0	6.9	11.9	74.4
Block Island, Rhode Island	66.9	61.4	5.5	9.0	68.7
Boston, Massachusetts	68.7	63.1	5.6	21.3	70.8
Buffalo, New York	76.0	69.0	7.0	10.3	68.5
Cedar Keys, Florida	85.0	80.3	5.3	8.0	80.3
Charleston, South Carolina	85.1	80.4	4.7	38.2	79.9
Chicago, Illinois	72.7	67.0	5.7	9.1	71.4
Chincoteague, Virginia	84.1	72.0	12.1	3.5	74.5
Cleveland, Ohio	75.0	67.9	7.1	14.0	69.9
Detroit, Michigan	72.9	67.8	5.1	26.6	71.0
Duluth, Minnesota	69.4	59.3	13.1	9.6	66.1
Eastport, Maine	51.3	46.6	4.7	16.7	60.8
Escanaba, Michigan	66.7	57.3	9.4	18.2	65.5
Galveston, Texas	88.8	84.1	4.7	13.2	82.8
Grand Haven, Michigan	74.5	61.0	13.5	19.0	65.9
Indianola, Texas					
Jacksonville, Florida	85.7	81.0	4.7	18.0	80.9
Key West, Florida	89.5	82.7	6.8	18.6	85.7
Mackinaw City, Michigan	67.5	61.3	6.2	10.0	64.5
Macon, Fort, North Carolina	85.9	74.4	11.5	11.9	78.9
Marquette, Michigan	64.3	46.2	18.1	12.0	64.1
Milwaukee, Wisconsin					
Mobile, Alabama	84.5	79.1	5.4	17.7	78.6
New Haven, Connecticut	76.5	67.0	9.5	16.6	70.1
New London, Connecticut	70.3	62.0	8.3	13.4	70.2
New York City	75.8	68.3	7.5	16.2	72.9
Norfolk, Virginia	81.2	73.3	7.9	16.5	76.1
Pensacola, Florida	80.5	81.3	5.2	17.5	80.2
Portland, Maine	60.9	54.6	6.3	16.9	66.5
Portland, Oregon	75.4	66.4	9.0	54.0	67.4
Sandusky, Ohio	78.6	71.5	7.1	11.4	71.0
Sandy Hook, New Jersey	75.0	66.9	8.1	13.6	72.7
San Francisco, California	62.2	55.8	6.4	37.1	59.1
Savannah, Georgia	81.7	76.2	5.5	10.5	80.5
Smithville, North Carolina	84.8	76.2	8.6	10.8	79.5
Toledo, Ohio	7.0	72.1	5.9	13.5	71.4
Wilmington, North Carolina	82.9	76.1	6.8	10.3	78.6

• Observations temporarily suspended.

WINDS.

The most frequent directions of the wind during July, 1886, are shown on chart ii by the arrows flying with the wind; they are also given in the table of miscellaneous meteorological data. In the Gulf States and Florida the prevailing direction of the wind is from the south; in the south Atlantic states from the southwest. In all other districts it is variable.

HIGH WINDS.

[In miles per hour.]

Wind-velocities of fifty or more miles per hour were recorded during the month, as follows:

Mount Washington, New Hampshire, 70, w., 6th; 82, w., 7th; 64, nw., 8th; 59, nw., 10th; 66, w., 11th; 70, w. 12th; 55, se., 14th; 65, se., 15th; 84, sw., 16th; 59, w., 19th; 59, w., 20th; 59, nw., 22d; 58, nw., 23d; 65, nw., 24th; 50, nw., 27th; 50, w., 29th; 62, w., 30th.

Pike's Peak, Colorado, 61, w., 1st.

Nashville, Tennessee, 75, nw., 10th.

Key West, Florida, 52, sw., 18th.

Fort Elliott, Texas, 64, nw., 19th.

Fort Assinaboine, Montana, 59, w., 26th.

Sandy Hook, New Jersey, 72, nw., 30th.